In the Claims:

1. A method of calibrating the data acquisition path comprising the steps of: applying a voice utterance signal simultaneously to two speech transmission paths where the first path is a high quality reference path and a second test path being the acquisition path ; detecting output power density of the reference path to produce signal Y_R and detecting output power density of the second test path to produce the power density of the mismatch signal Y_N; processing said reference signal Y_R and said mismatch signal Y_N to determine channel estimate and noise estimate of the mismatch using equations derived by modeling convolutive H_Δ and additive noise N_N as polynomial functions of frequency with one order P for H_Δ and a different order Q for N_N, estimating model parameters using maximum likelihood criterion to determine the parameter set and simultaneously solving linear equation for both order P and Q.

2. The method of Claim 1 wherein said solving step includes solving simultaneously one linear equation for the order of P and another for Q .

3. The method of Claim 1 wherein said solving step includes jointly solving linear equation for P+Q variable.

4. A method of calibrating the data acquisition path for each utterance comprising the steps of: applying a voice utterance signal simultaneously to two speech transmission paths where the first path is a high quality reference path and a second test path being the acquisition path ; detecting output power density of the reference path to produce signal Y_R and detecting output power density of the second test path to produce the power density of the mismatch signal Y_N;

determining for each frame of the utterance the power spectrum for Y_R and Y_N; calculating for all of the frames of the utterance the following

$$A_{(P\times P)} \triangleq [A_1, A_2, \ldots A_P]^t$$

$$B_{(P\times Q)} \triangleq [B_1, B_2, \ldots B_P]^t$$

$$C_{(Q\times P)} \triangleq [C_1, C_2, \ldots C_Q]^t = B^T$$

$$D_{(Q\times Q)} \underline{\underline{\Delta}} [D_1, D_2, \ldots D_Q]^t$$

$$\mathbf{u} \underline{\underline{\Delta}} [u_1, u_2, \ldots u_p]^t \text{ with } u_p = \alpha(p-1, Y_R Y_N)$$

$$\mathbf{v} \underline{\underline{\Delta}} [\upsilon_1, \upsilon_2, \ldots \upsilon_Q]^t \text{ with } \upsilon_q = \beta(q-1, Y_N)$$

for A,B,C,D,u and v; calculating for the utterance the noise estimate θ_N using the following: $(D - B^t A^{-1} B)\theta_N = \mathrm{v} - B^t A^{-1} u$; and calculating for the utterance the channel estimate θ_H using the following: $\theta_H = A^{-1}(u - B\theta_N)$.

5. A method of calibrating the data acquisition path for each utterance comprising the steps of: applying a voice utterance signal simultaneously to two speech transmission paths where the first path is a high quality reference path a high and a second test path being the acquisition path to produce the mismatch signal Y_N;

determining for each frame of the utterance the power spectrum for Y_R and Y_N;

calculating for all of the frames of each utterance the following

$$A_{(P\times P)} \underline{\underline{\Delta}} [A_1, A_2, \ldots A_P]^t$$

$$B_{(P\times Q)} \underline{\underline{\Delta}} [B_1, B_2, \ldots B_P]^t$$

$$C_{(Q\times P)} \underline{\underline{\Delta}} [C_1, C_2, \ldots C_Q]^t = B^T$$

$$D_{(Q\times Q)} \underline{\underline{\Delta}} [D_1, D_2, \ldots D_Q]^t$$

$$\mathbf{u} \underline{\underline{\Delta}} [u_1, u_2, \ldots u_p]^t \text{ with } u_p = \alpha(p-1, Y_R Y_N)$$

$$\mathbf{v} \underline{\underline{\Delta}} [\upsilon_1, \upsilon_2, \ldots \upsilon_Q]^t \text{ with } \upsilon_q = \beta(q-1, Y_N)$$

for A,B,C,D,u and v;

calculating the noise estimate θ_N and the channel estimate θ_H using the following: $\begin{bmatrix} \mathrm{A} & \mathrm{B} \\ \mathrm{C} & \mathrm{D} \end{bmatrix} \begin{bmatrix} \theta_H \\ \theta_N \end{bmatrix} = \begin{bmatrix} u \\ \mathrm{v} \end{bmatrix}$.

6. A data acquisition path calibration device comprising:

a first speech transmission path including a high quality microphone and pre-A/D processing and a second test acquisition path including a lower quality microphone;

means for detecting for each frame the power spectrum density of an input signal received over said first path to produce a reference signal Y_R and for detecting for each frame the power spectrum density of said input signal received over said acquisition path to produce mismatch signal Y_N

means for determining the noise estimate and the channel estimate by calculating for each utterance: $A_{(P\times P)} \underline{\underline{\Delta}} [A_1, A_2, \ldots A_P]^t$

$$B_{(P\times Q)} \underline{\underline{\Delta}} [B_1, B_2, \ldots B_P]^t$$

$$C_{(Q\times P)} \underline{\underline{\Delta}} [C_1, C_2, \ldots C_Q]^t = B^T$$

$$D_{(Q\times Q)} \underline{\underline{\Delta}} [D_1, D_2, \ldots D_Q]^t$$

$$\mathbf{u} \underline{\underline{\Delta}} [u_1, u_2, \ldots u_p]^t \text{ with } u_p = \alpha(p-1, Y_R Y_N)$$

$$\mathbf{v} \underline{\underline{\Delta}} [\upsilon_1, \upsilon_2, \ldots \upsilon_Q]^t \text{ with } \upsilon_q = \beta(q-1, Y_N)$$

for A,B,C,D,u and v;

calculating for the utterance the noise estimate θ_N using the following: $(D - B^t A^{-1} B)\theta_N = \mathrm{v} - B^t A^{-1} u$;

and calculating for the utterance the channel estimate θ_H using the following: $\theta_H = A^{-1}(u - B\theta_N)$.

7. A data acquisition path calibration device comprising:

a first speech transmission path including a high quality microphone and pre-A/D processing and a second test acquisition path including a lower quality microphone;

means for detecting for each frame the power spectrum density of an input signal received over said first path to produce a reference signal Y_R and for detecting for each frame the power spectrum density of said input signal received over said acquisition path to produce mismatch signal Y_N

means for determining the noise estimate and the channel estimate by calculating for each

$$\text{utterance: } A_{(P\times P)} \underline{\underline{\Delta}} \left[A_1, A_2, \ldots A_P\right]^t$$

$$B_{(P\times Q)} \underline{\underline{\Delta}} \left[B_1, B_2, \ldots B_P\right]^t \; C_{(Q\times P)} \underline{\underline{\Delta}} \left[C_1, C_2, \ldots C_Q\right]^t = B^T$$

$$D_{(Q\times Q)} \underline{\underline{\Delta}} \left[D_1, D_2, \ldots D_Q\right]^t$$

$$\mathbf{u} \underline{\underline{\Delta}} \left[u_1, u_2, \ldots u_p\right]^t \text{ with } u_p = \alpha\left(p-1, Y_R Y_N\right)$$

$$\mathbf{v} \underline{\underline{\Delta}} \left[\upsilon_1, \upsilon_2, \ldots \upsilon_Q\right]^t \text{ with } \upsilon_q = \beta\left(q-1, Y_N\right)$$

for A,B,C,D,u and v;

calculating the noise estimate θ_N and the channel estimate θ_H using the

$$\text{following:} \begin{bmatrix} \mathrm{A} & \mathrm{B} \\ \mathrm{C} & \mathrm{D} \end{bmatrix} \begin{bmatrix} \theta_H \\ \theta_N \end{bmatrix} = \begin{bmatrix} u \\ \mathrm{v} \end{bmatrix}.$$